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## Analysis of the prevalence of pediculosis and scabies in orphanages and refugee shelters in south-eastern Poland

Andrzej Tytuła<sup>1</sup>, Katarzyna Bartosik<sup>2</sup>, Anita Jaształ-Kniażuk<sup>1</sup>, Weronika Buczek<sup>2</sup>,  
Aleksandra Błaszkiwicz<sup>2</sup>, Agnieszka Borzęcka-Sapko<sup>2</sup>

<sup>1</sup>Regional Chamber of Nurses and Midwives in Lublin

<sup>2</sup>Medical University of Lublin, Chair and Department of Biology and Parasitology

### Abstract

Grouping conditions refer to a situation when number of entities is considered as a unit. The members of such a community resides in a certain area at a specified time and has to comply with specific rules of social life. The analysis of the data from orphanages and refugee shelters in south-eastern Poland has confirmed that this type of living conditions promote transmission of scabies and pediculosis, and these diseases were most frequently diagnosed in young people taking active part in social life.

Our study revealed that invasions of *Pediculus humanus* and *Sarcoptes scabiei* are still current public health threats although the obligation to report cases of these diseases in Poland has been abolished.

**Key words:** pediculosis capitis, scabies, orphanages, refugee shelters, Poland

### Introduction

Scabies and pediculosis are one of the most common parasitic skin diseases. Despite the civilisation progress, they are still a serious medical and social problem. The symptoms of both diseases are not only bothersome but adversely affects the appearance and hinders social interactions [1]. The infection is caused by direct contact with the skin of an infected person or is more rarely transmitted indirectly by contact with infected objects. The diseases most often spread among subjects that are in close contact with each other and in large groups of people in educational institutions and care centres [2].

The aetiological factor of scabies is a parasitic mite (*Sarcoptes scabiei* var. *hominis*, Linnaeus 1758) [3]. Very intense pruritus, especially at night, is a characteristic symptom of the infection. Other signs include skin lesions located on upper extremities, hands, buttocks, in natural skin folds, the area of reproductive organs, and mammillas in females. Approximately 300 million cases of this disease are reported annually worldwide [4]. In Poland, 57,352 cases of scabies

infection were reported in 2004-2008 by National Institute of Public Health [5]. In this period, a slight fluctuation of incidence rate was observed. Scabies was not included in the list of infectious diseases published in the appendix to the *Act of 5 December 2008 on prevention and control of infections and contagious diseases in humans*. Due to the 2008 abolishment of the obligation to register infections with this mite, there are no detailed epidemiological data from subsequent years [6].

Pediculosis is a parasitic disease caused by the human louse (*Pediculus humanus*, Linnaeus 1758). Depending on the aetiological factor, pediculosis can be caused by head, clothes, and pubic lice. In the most common head lice, skin lesions are mainly located on the scalp and, less frequently, on the eyebrows, eyelashes, or chin [7]. Pruritus associated with skin lesions causes numerous excoriations upon scratching. At the sites of emerging wounds, secondary bacterial superinfections may develop. Head pediculosis is widespread throughout the world. The prevalence of pediculosis is influenced by the socio-economic status, population density, and compliance with hygiene rules [8, 9, 10]. The incidence of pediculosis in the United States is estimated to range between 1.8% and 3.6% per year [11]. In Europe, the prevalence of this parasitosis is in the range from 1% to 22% [12, 13]. According to the reports of National Institute of Public Health there were 6,960 cases of pediculosis in Poland during the last five years of its mandatory reporting 2004-2008. In this period an increasing incidence rate was observed [5].

The aim of the study was to obtain up-to-date data on the occurrence of pediculosis in confinement conditions, i.e. in facilities where a group of people is under the constant care of state institutions and medical supervision in south-eastern Poland.

### **Material and methods-**

Information on the prevalence of pediculosis and scabies was obtained directly from care institutions that register cases of these parasitoses in internal procedures. The data come from three centres for foreigners in Poland supervised by the Office for Foreigners. Statistical data on the prevalence of pediculosis and scabies among foreigners were provided by the health care unit responsible for health services in refugee shelters based on a relevant cooperation agreement. The analysed data covered the years 2015-2016, which was associated with the change of the medical entity responsible for the provision of health services.

Data on the prevalence of pediculosis and scabies in the care and educational institutions from the Lublin Province were obtained from four orphanages, although requests were sent to a greater number of such institutions. The information covered the years 2013-2016, and the analysis thereof took into account the age and sex of the charges of the care and educational institutions. Noteworthy, the process of acquisition of the information about the incidence of pediculosis and scabies is hampered by the fear of stigmatisation of charges of care and education centres. For these reasons, we do not provide the location of the facilities where the data were collected. Such a fear indicates insufficient public awareness of these infectious diseases and the routes of transmission thereof.

### **Results and discussion**

Orphanages are stationary round-the-clock care and education institutions. They have been established for children whose parents cannot provide them with proper conditions of living and development or meet children's emotional, developmental, and health-related needs. In accordance with the law, a child placed in a care and educational institution should be provided with access to health care [14, 15, 16]. Despite the lack of a statutory obligation, health service specified by the law is provided to orphanage children when the authorities of the care and educational institution decide to employ a nurse [16, 17].

Since care and educational facilities constitute an institutional form of care with the rules of life in confinement conditions, they are burdened with an increased risk of occurrence of infections with permanent human parasites. *S. scabiei* and *P. humanus* spread via close contact with an infected person or objects used by the person every day. Their occurrence has health consequences,

e.g. secondary bacterial infections, responses of the immune system [18, 19] risk of infectious diseases transmitted by lice, and the risk of social stigmatisation in the peer group [20-25]. In the case of an unusual course of *S. scabiei* invasion, additional diagnostic difficulties may emerge and delay the application of proper treatment, and the patient remains a source of infection in the environment for a long time [26-28].

The analysis of the available data indicates a downward trend in the extensiveness of *P. humanus* infection in the care and education institutions in the analysed period. The data obtained from 4 care and educational centres indicate that the number of pediculosis cases in 2013-2016 varied from 47 to 11, with the highest prevalence of 29.4% recorded in 2014 (Tab. 1).

**Table 1.** Prevalence of scabies and pediculosis in orphanages in south-eastern Poland (2013-2016); n=160.

years	<i>Scabies</i>		<i>Pediculosis</i>	
	number of cases	prevalence (%)	number of cases	prevalence (%)
2013	0	0	30	18.8
2014	14	8.8	47	29.4
2015	8	5.0	11	6.9
2016	0	0	16	10.0
<b>2013-2016</b>	<b>22</b>	<b>6.9</b>	<b>104</b>	<b>16.3</b>

n= the number of individuals in a group under study

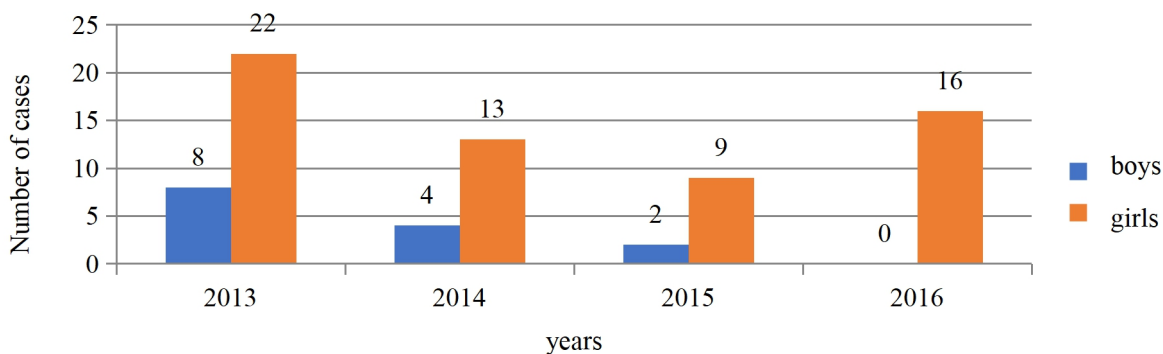
Most cases of pediculosis were reported in the age group under 18 years of age. In 2014, they accounted for 45.2%. In turn, no cases of pediculosis were detected in the group above 18 years of age in the same period. The cases of pediculosis in this age group in the study period (2013-2016) did not exceed 3.8% (Tab. 2).

**Table 2.** Cases of pediculosis in orphanages in south-eastern Poland according to the age of infested subjects (2013-2016); n=104

years	number of cases	Age			
		under 18 years		above 18 years	
		cases	(%)	cases	(%)
2013	30	28	26.9	2	1.9
2014	47	47	45.2	0	0.0
2015	11	9	8.7	2	1.9
2016	16	16	15.4	0	0.0
<b>Total</b>	<b>104</b>	<b>100</b>	<b>96.2</b>	<b>4</b>	<b>3.8</b>

n= number of cases in the group studied

The relationship between the prevalence of pediculosis and the age of children has also been confirmed by other authors [21, 24, 25]. It is a consequence of specific behaviours associated with the stage of psychosocial development in this age group. These include e.g. borrowing personal items and the evident need for closeness, especially in the group of younger children. The analysis of the collected material also indicated a relationship between the child's sex and the prevalence of pediculosis (Figure 1).



**Figure 1.** Cases of pediculosis in orphanages in south-eastern Poland according to the sex of infested subjects (2013-2016); n=74

In 2013, pediculosis diagnosed in boys represented 26.67% and the disease in girls accounted for 73.33% of the cases. This trend persisted in each study year, and all cases of pediculosis reported in 2016 were diagnosed in female children (Fig. 1). The number of cases presented in Table 1 and 2 is not identical to Figure 1, as we did not receive information about the sex of the infected children from one of the institutions.

Analysis of 74 cases of pediculosis diagnosed from 2013 to 2016 where information about the sex of the infected children was provided showed 18.9% of boys (14 cases) and 81.1% of girls (60 cases) afflicted by the disease. The analysis of the collected material correlates with results reported by other authors, who demonstrate that pediculosis is far more frequently diagnosed in females. The relationship between the prevalence of pediculosis and the sex is associated with the fact that girl's long hair supports the persistence of invasions by these ectoparasites [13, 21, 24, 25, 29]. It is also related to a behaviour that is characteristic of girls, i.e. borrowing of everyday use objects such as hair bands, combs, and headbands, as well as the greater intimacy in the relationships between girls than between boys.

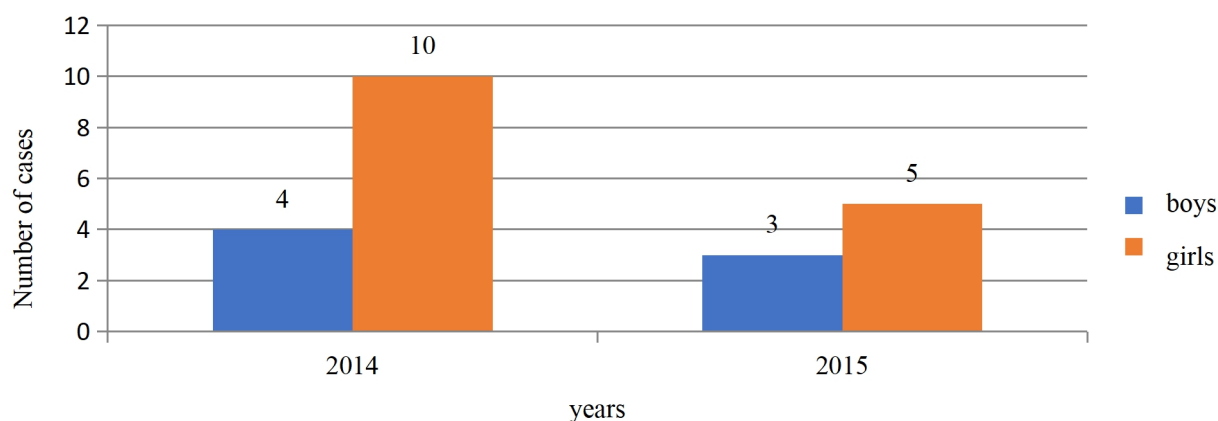
During the study, 22 cases of scabies were reported in the orphanages in 2014 and 2015 (Tab. 1). As many as 95.5% of the scabies cases were diagnosed in subjects under the age of 18 years (21 cases), whereas 4.5% of the group above 18 years of age were infected (1 case) (Tab. 3).

A higher percentage of scabies cases were diagnosed in girls. The following data were collected in this area: in 2014 there were 14 cases of scabies (63.6% of all cases noted in the study period) with 4 cases (18.2%) in boys and 10 cases (45.5%) in girls, whereas in 2015 there were 8 cases of scabies (36.4% of all cases) with 3 cases (13.6%) in boys and 15 cases (22.7%) in girls (Fig. 2). A higher incidence of pediculosis and scabies was observed in the under-18 age group and in the female group. The statistical data in this field correlate with results reported by other researchers [21, 24, 25, 30, 32, 33].

**Table 3.** Cases of scabies in orphanages in south-eastern Poland according to the age of infested subjects (2013-2016); n=22

years	number of cases	Age			
		under 18 years		above 18 years	
		cases	(%)	cases	(%)
2013	0				
2014	14	13	59.1	1	4.5
2015	8	8	36.4	0	0
2016	0				
<b>Total</b>	<b>22</b>	<b>21</b>	<b>95.5</b>	<b>1</b>	<b>4.5</b>

n= number of cases in the group studied



**Figure 2.** Cases of scabies in orphanages in south-eastern Poland according to the sex of infested subjects (2014-2015); n=22

Given the organisation of health care provided to adolescent children in Poland and the fact that the applicable law imposes no obligation to employ nurses in care and educational centres, prophylaxis actions aimed at prevention of pediculosis and scabies are undertaken by educational and care institutions as organised activity involving directors of the institutions, teachers, educators, tutors, custodians, parents, and nurses from the care and educational milieu. In this way, the burden of controlling these diseases and anti-epidemic activities has been shifted from sanitary inspections to educational and care institutions for children [14, 15, 34, 35, 36]. This implies that, regardless of the place of residence of the schoolchild, custodians (parents or staff of care and educational institutions) are obliged to apply relevant procedures when pediculosis or scabies are diagnosed in their charges [35, 36].

The definition of living in confinement conditions also refers to such human environments as refugee shelters. Foreigners who have been granted refugee status [37] have access to health care by virtue of international agreements and Polish legislation. All foreigners applying for refugee status in Poland are provided medical care, including programs of early detection, diagnosis, and treatment of infectious diseases, and undergo diagnostic examinations in epidemiological screening. This is targeted at initial clinical and epidemiological-sanitary verification of health of subjects crossing the borders of Poland and applying for refugee status [16, 37-39]. The Act of 13 June 2003 on granting protection to foreigners within the territory of the Republic of Poland [37] states that refugees shall be subjected to medical examinations and sanitary procedures before admission to the shelter. Additionally, refugees residing in shelters are obliged to undergo such examinations and treatments in accordance with indications from the shelter medical supervisor [37, 38]. Since residing in a refugee shelter is a form of life in confinement conditions, data on the occurrence of pediculosis and scabies among foreigners in the Lublin Province was carried out.

In total, 116 pediculosis cases, which accounts for 10.5%, were detected among the foreigners during the research period (Tab. 4). The analysis for 2015-2016 revealed altogether 30 cases of pediculosis in males (25.9% of all cases noted) and 86 cases (73.3%) in females (Tab. 5). In terms of the age of the foreigners, the analysis of the data unequivocally demonstrated that the majority of pediculosis cases were detected in subjects under 18 years of age. The data for 2015-2016 indicate that 101 cases of pediculosis (87.1%) afflicted patients under the age of 18. In the group over 18 years of age, pediculosis was recorded in only 15 cases, i.e. 12.9% of all refugees infested by the parasite (Tab. 6). In the world literature there are only few data concerning the above mentioned analysis. The prevalence of head louse invasion in Kosovar refugees arrived in the United States, demonstrated during the study in 1999 was 10%. Among the infected persons women prevailed (74%), and the most cases of the disease were related to the age group 6-15 years [40]. Similar patterns were observed among children of Chinese refugees residing in mountainous areas

of northern Thailand. The prevalence of *P. capitis* infestation among individuals aged 8-14 was 14.2% and cases were noted only among girls [41].

**Table 4.** Prevalence of pediculosis in refugee shelters in south-eastern Poland (2015-2016); n=1095

years	number of refugees examined	number of cases	prevalence (%)
2015	517	36	6.9
2016	578	80	13.8
<b>2015-2016</b>	<b>1095</b>	<b>116</b>	<b>10.5</b>

n= the number of individuals in a group under study

**Table 5.** Cases of pediculosis in refugee shelters in south-eastern Poland according to the sex of infested subjects (2015-2016); n=116

years	number of cases	gender			
		males		females	
		cases	(%)	cases	(%)
2015	36	13	11.2%	23	19.8%
2016	80	17	14.7%	63	54.3%
<b>Total</b>	<b>116</b>	<b>30</b>	<b>25.9%</b>	<b>86</b>	<b>73.3%</b>

n= number of cases

**Table 6.** Cases of pediculosis in refugee shelters in south-eastern Poland according to the age of infested subjects; n=116

year	number of cases	Age			
		under 18 years		over 18 years	
		cases	(%)	cases	(%)
2015	36	32	27.6	4	3.4
2016	80	69	59.5	11	9.5
<b>Total</b>	<b>116</b>	<b>101</b>	<b>87.1</b>	<b>15</b>	<b>12.9</b>

n= number of cases

The above data indicate that pediculosis and scabies are still current global problems especially among children. The organisation of health care in Poland provides residents of orphanages and foreigners staying in refugee shelters with access to health services. However, the lack of a statutory obligation to employ nurses in care and educational facilities and the abolishment of the duty to report the occurrence of pediculosis and scabies hamper implementation of quick and efficient therapies. This is a particularly important issue in the case of a population of adolescents included in the foster care system or another form of institutionalised assistance.

#### Authors' contributions

KB: designation and direction of the study, analysis and interpretation of data, writing and critical revision of the manuscript; AT: acquisition, analysis and interpretation of data, drafting of manuscript, lead in writing of the manuscript; AJK, WB, AB, AMB: drafting of manuscript. All authors discussed the results and commented on the manuscript as well as approved its final version.

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